

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
18 November 2004 (18.11.2004)

PCT

(10) International Publication Number
WO 2004/099342 A1

(51) International Patent Classification⁷: C09K 11/78

(21) International Application Number:
PCT/KR2003/002550

(22) International Filing Date:
25 November 2003 (25.11.2003)

(25) Filing Language: Korean

(26) Publication Language: English

(30) Priority Data:
10-2003-0029928 12 May 2003 (12.05.2003) KR
10-2003-0048324 15 July 2003 (15.07.2003) KR
10-2003-0083094 21 November 2003 (21.11.2003) KR

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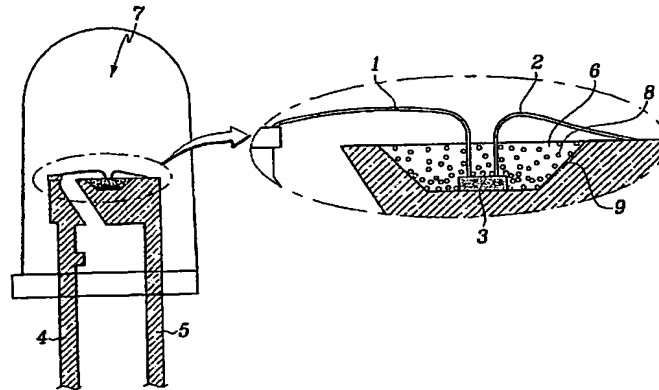
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(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

[Continued on next page]

(54) Title: TB,B-BASED YELLOW PHOSPHOR, ITS PREPARATION METHOD, AND WHITE SEMICONDUCTOR LIGHT EMITTING DEVICE INCORPORATING THE SAME



(57) Abstract: The present invention relates to a terbium borate-based yellow phosphor, a preparation method thereof, and a white semiconductor light emitting device incorporating the same. The terbium borate-based yellow phosphor of the present invention is represented by the general formula $(Tb_{1-x-y-z}RE_xA_y)_3D_bB_6O_{12} \cdot Ce_z$ (where, RE is at least one rare earth element selected from the group consisting of Y, Lu, Sc, La, Gd, Sm, Pr, Nd, Eu, Dy, Ho, Er, Tm and Yb; A is a typical metal element selected from the group consisting of Li, Na, K, Rb, Cs and Fr; D is a typical amphoteric element selected from the group consisting of Al, In and Ga; $0 \leq x < 0.5$; $0 \leq y < 0.5$; $0 < z < 0.5$; $0 < a < 5$; and $0 < b < 5$). The white semiconductor light emitting device of the present invention comprises a semiconductor light emitting diode and the yellow phosphor, which absorbs a portion of light emitted by the semiconductor light emitting diode and emits light of wavelength different from that of the absorbed light. It offers white light from the combination of the light emitted by the semiconductor light emitting diode and the light emitted by the yellow phosphor. The white semiconductor light emitting device of the present invention offers a greatly improved color rendering and experiences less deterioration in light emission efficiency over a long period of service.



European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Published:

— with international search report

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference OPP031806KR	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/KR2003/002550	International filing date (<i>day/month/year</i>) 25 NOVEMBER 2003 (25.11.2003)	(Earliest) Priority Date (<i>day/month/year</i>) 12 MAY 2003 (12.05.2003)
Applicant LUXPIA CO., LTD. et al		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II)

3. ☐ Unity of invention is lacking (See Box No. III)

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 1

☐ as suggested by the applicant.

☒ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

b. ☐ none of the figure is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2003/002550**A. CLASSIFICATION OF SUBJECT MATTER**

IPC7 C09K 11/78

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 C09K11/08, 11/63, H01L33/00,

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and applications for inventions since 1975

Korean Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NPS, PAJ, USPAT

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 98/05078 A1 (NICHIA KAGAKU KOGYO KABUSHIKI KAISHA) 05. FEBRUARY 1998 page16 line6-page18 line8, example1, claim1,-5,9	1,3,4-10,16,17
A	US 2002/0070681 A1 (MATSUSHITA ELECTRIC IND. CO. LTD.) 13. JUNE 2002 column70-73, 77, claim 1-3,	1,3,5-7
A	EP 1,148,110 A2 (OSRAM SYLVANIA INC.) 24. OCTOBER 2001 column14-16, example1, claim1	1,4
A	JP 2000-226576 A (KOKUSAI KIBAN ZAIRYO KENKYUSHO : KK) 15. AUGUST 2000 abstract, column5	4
A	KR 2001-0067240 A (GEORGIA TECH RESEARCH CO., SAMSUNG SDI CO., LTD.) 12. JULY 2001 abstract, example1	4

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

09 MARCH 2004 (09.03.2004)

Date of mailing of the international search report

10 MARCH 2004 (10.03.2004)

Name and mailing address of the ISA/KR

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920 Dunsan-dong, Seo-gu, Daejeon 302-701,
Republic of Korea

Facsimile No. 82-42-472-7140

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Telephone No. 82-42-481-5575



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2003/002550

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 936682 A1	18.08.1999
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KR 2001-0067240 A	12.07.2001	NONE	